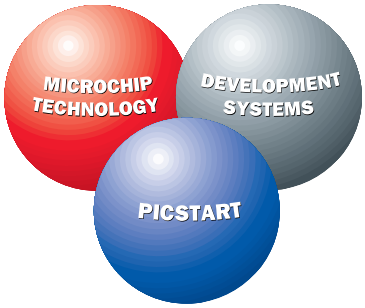
PICSTART®Plus

User's Guide



Information contained in this publication regarding device applications and the like is intended through suggestion only and may be superseded by updates. No representation or warranty is given and no liability is assumed by Microchip Technology Incorporated with respect to the accuracy or use of such information, or infringement of patents or other intellectual property rights arising from such use or otherwise. Use of Microchip's products as critical components in life support systems is not authorized except with express written approval by Microchip. No licenses are conveyed, implicitly or otherwise, under any intellectual property rights.

The Microchip logo and name, PIC, PICMASTER, PICSTART, and TrueGauge are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries. MPLAB, and PRO MATE are trademarks of Microchip in the U.S.A.

All rights reserved. All other trademarks mentioned herein are the property of their respective companies.

© Microchip Technology Incorporated 1995.

*fuzzy*TECH is a registered trademark of Inform Software Corporation.

Intel is a registered trademark of Intel Corporation.

IBM PC/AT is a registered trademark of International Business Machines Corporation.

Netscape is a trademark of Netscape Communications Corporation.

Windows, Excel and Microsoft Explorer, Dynamic Data Exchange are trademarks of Microsoft Corporation.

PICSTART Plus USER'S GUIDE

© 1996 Microchip Technology Inc.

Table of Contents

PICSTART Plus Preview

A Quick Look at PICSTART Plus Development System 1

Chapter 1. About PICSTART Plus

Introduction 3
MPLAB Integrated Development Environment 3
PICSTART Plus Tools 3
System Requirements 3
About This Guide 4
Recommended Reading 5
Warranty Registration 5
Customer Support 5

Chapter 2. PICSTART Plus Installation

Introduction 7
PICSTART Plus Setup 7

Chapter 3. PICSTART Plus Basic Functions

Introduction 9
Highlights 9
Enabling the PICSTART Plus 10
The PICSTART Plus Program Status dialog 12
Programming a Microcontroller Device 12
Verifying a Microcontroller Device 13
Checking for a Blank Device 13
Reading a Device Master 13
Files Used by PICSTART Plus 15

Chapter 4. Using PICSTART Plus

Introduction 17
Highlights 17
Preliminary Setup Requirements 17
Accessing MPLAB Tools and Menu Functions 17
Loading PIC16/17 Hex Code 18
Checking For a Blank Device 19
Programming a Device 20
Reading a Device Master 21

© 1996 Microchip Technology Inc.

Chapter 5. PICSTART Plus Menu Options

Introduction 23
Programmer 23
Options 30

Chapter 6. Migrating from Other PICSTART Systems

Appendix A. Troubleshooting Guide

Appendix B. On Line Support

Introduction 35
Connecting to the Microchip Internet Web Site 35
Connecting to the Microchip BBS 36
Using the Bulletin Board 36
Software Releases 37
Systems Information and Upgrade Hot Line 38

Appendix C. Connecting to a 25-Pin Serial Port

Glossary

Introduction 41
PICSTART Plus Terms 41

Index

Index 49

© 1996 Microchip Technology Inc.

PICSTART Plus Preview

A Quick Look at PICSTART Plus Development System

What is PICSTART Plus

Congratulations on selecting the PICSTART Plus, a Microchip microcontroller development programmer. The PICSTART Plus enables you to quickly and easily program user software into PIC16/17 18-pin, 28-pin, and 40-pin microcontroller devices (DIP packages only).

Note: The PICSTART Plus development system is designed for use in firmware development and is not intended for production use.

The PICSTART Plus is CE compliant.

The PICSTART Plus development system is designed, tested and certified to meet the Electromagnetic Compatibility requirements known as the CE compliance directives. These standards set by the European Union (EU) countries include limiting radiated emission, improving susceptibility to radiated emission and improving susceptibility to Electrostatic Discharge (ESD).

How PICSTART Plus Helps You

The PICSTART Plus device programmer is a device programmer system that has the following features:

- Programs PIC16/17 microcontrollers
- Operates a Windows® 3.1 application on a PC compatible host system with the MPLAB™ Integrated Development Environment
- Communicates with the PC via a standard RS-232 cable
- With MPLAB the user can create, display, and edit files to be programmed into PIC16/17 microcontrollers

The PICSTART Plus device programmer comes with the following accessories for you to use with the PC Host computer:

- RS-232 Interface cable to a standard PC serial port
- Universal power supply
- MPLAB, an Integrated Development Environment including a text editor, project manager, MPASM assembler, and MPLAB-SIM debugger

© 1996 Microchip Technology Inc.

PICSTART Plus USER'S GUIDE

© 1996 Microchip Technology Inc.

Chapter 1. About PICSTART Plus

Introduction

This section will present an overview of the PICSTART Plus development programmer. The features and requirements of PICSTART Plus are presented.

MPLAB Integrated Development Environment

The MPLAB Integrated Development Environment (IDE) is the host software for PICSTART Plus. You will be able to load in your hex files and program with the PICSTART Plus without reading the MPLAB User's Guide. To take advantage of the MPLAB editor, project manager, and built in MPASM support, read the MPLAB User's Guide. With MPLAB-SIM (described in the MPLAB User's Guide) you will be able to test execution of your code and perform most debugging functions without an emulator.

PICSTART Plus Tools

You can set up PICSTART Plus on any serial communications port on your PC.

PICSTART Plus provides you with all the tools to program development code (firmware) into PIC16/17 devices.

You can program memory, configuration bits, and ID locations into PIC16/17 devices.

You can verify that PIC16/17 microcontrollers are blank, verify that code in the target microcontroller matches your firmware, and you can read code from an unprotected PIC16/17 microcontroller into MPLAB's program memory window for debugging and programming into other PIC16/17 devices.

System Requirements

MPLAB installed on IBM PC/AT® compatible 386 or better with:

- Windows® 3.1
- 4 MB of Memory, 16 MB Recommended
- 8 MB of Hard Disk Space, 20 MB Recommended
- Serial Port

© 1996 Microchip Technology Inc.

About This Guide

This user guide describes how to use the PICSTART Plus development programmer with MPLAB, the Integrated Development Environment for Microchip development tools. The layout of the manual is as follows:

Chapter 1 - About PICSTART Plus - An overview of the features and benefits of the PICSTART Plus development programmer.

Chapter 2 - PICSTART Plus Installation - Instructions for installing the PICSTART Plus hardware and software.

Chapter 3 - PICSTART Plus Basic Functions - An overview of the features of PICSTART Plus, covering all the basic hardware functions, and explaining the MPLAB software interface.

Chapter 4 - Using PICSTART Plus - A walk-through on using PICSTART Plus in a typical application.

Chapter 5 - PICSTART Plus Menu Options - Reference material that covers each of the PICSTART Plus MPLAB menu options, and the basic MPLAB software dialogs for PICSTART Plus.

Chapter 6 - Migrating from Other PICSTART Systems - Information for users of other PICSTART systems.

Appendix A - Troubleshooting Guide - A list of solutions for common problems.

Appendix B - On Line Support - Information on Microchip's electronic support services.

Appendix C - Connecting to a 25-pin Serial port - Connection details on hooking PICSTART Plus up to a 25-pin RS-232 serial port

Index - Alphabetical index to PICSTART Plus User's Guide

Worldwide Sales and Service - Listing of worldwide Microchip sales offices.

© 1996 Microchip Technology Inc.

Recommended Reading

README.PLS For the latest information on using PICSTART Plus, read the README.PLS file on the PICSTART diskette. The README.PLS file contains update information that may not be included in this manual.

PIC16/17 Microcontroller Data Book Contains comprehensive data sheets for Microchip PIC16/17 microcontroller devices available at print time. *Document Number DS00158, Microchip Technology Inc., Chandler, AZ.*

Embedded Control Handbook Contains a wealth of information about microcontroller applications. The application notes described in this manual are also available electronically through the Microchip BBS or from the Microchip Internet Home Page (see Appendix B for On Line Support information). *Document Number DS00092, Microchip Technology Inc., Chandler, AZ.*

MPLAB User's Guide Comprehensive guide that describes installation and features of Microchip's MPLAB, Integrated Development Environment, as well as the editor and simulator functions in the MPLAB environment. *Document Number DS30421B, Microchip Technology Inc., Chandler, AZ.*

Warranty Registration

Upon receiving the software diskettes, complete the enclosed Warranty Registration Card and mail it promptly. Sending in your Warranty Registration Card will ensure that you receive new product updates and notification of interim software releases that may become available.

Customer Support

Microchip endeavors at all times to provide the best service and responsiveness possible to its customers. Technical support questions should first be directed to your distributor and representative, local sales office, Field Application Engineer (FAE), or Corporate Applications Engineer (CAE).

The Microchip Internet Home Page can provide you with technical information, application notes, and promotional news on Microchip products and technology. The Microchip Web address is http://www.microchip.com.

You can also check with the Microchip BBS (Bulletin Board System) for non-urgent support, customer forums, and the latest revisions of Microchip systems development products. Refer to "**Appendix B: On Line Support**" for access information.

© 1996 Microchip Technology Inc.

© 1996 Microchip Technology Inc.

Chapter 2. PICSTART Plus Installation

Introduction

The PICSTART Plus development system requires the installation of MPLAB IDE software as well as interconnecting the hardware to the PC. This chapter covers the details of both software and hardware set up, including serial port configuration, processor selection, and enabling the PICSTART Plus from MPLAB.

PICSTART Plus Setup

Installing PICSTART Plus Hardware

PICSTART Plus provides communications with the host PC via an RS-232 9-pin D type connector. PICSTART Plus is DCE (data communication equipment), and hardware handshaking is via CTS (clear to send) and RTS (request to send).

Check your PC set up to see which communications port is available. Usually a mouse device is connected to COM1 or COM2. If you have a modem, you may not have a third serial port on your PC.

Connect the cable from your COM port to the PICSTART Plus development programmer.

A 6-foot data cable with DB-9 connectors is supplied with PICSTART Plus. All lines on the data cable are wired straight through. This cable is NOT a null modem cable.

PICSTART Plus Power Supply

The PICSTART Plus comes with a universal input power supply with IEC (International Electrotechnical Commission) power cord.

PICSTART Plus requires +9 volts +/- 10% at 500 mA (max.) on the center positive 2.5 mm terminal.

Plug the power supply into a power socket and connect the power supply cable to the PICSTART Plus.

© 1996 Microchip Technology Inc.

Configuring MPLAB for PICSTART Plus

You should install the MPLAB software by following the instructions in the MPLAB User's Guide. This is a brief summary:

- Insert MPLAB installation diskette 1 into drive A:
- From the Program Manager Run option, type **A:Setup.**
- Follow the on-screen instructions and install MPLAB
- Double click on the MPLAB icon to run MPLAB

Installing PICSTART Plus Software

- Insert PICSTART Plus diskette 1 into drive A:
- From the Program Manager Run option, type **A:Setup.**
- Follow the on-screen instructions and install PICSTART Plus

Configuring Serial Port for PICSTART Plus

If you are not already running the MPLAB software, double click on the MPLAB icon now to start. From the Options menu, select *PICSTARTPlusSetup>CommunicationsPortSetup*.

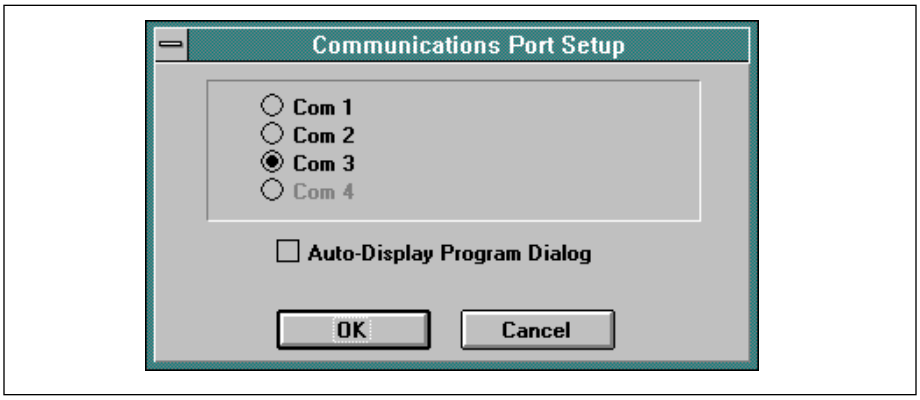


Figure 2.1 Communications Port Setup Dialog

The Communications Port Setup Dialog shows the possible PC serial communication ports. If the Auto-Display program dialog checkbox is checked, the Program/Verify dialog automatically pops up when the programmer is enabled. **OK** sets the options. **Cancel** will ignore the changes and close the dialog.

© 1996 Microchip Technology Inc.

Chapter 3. PICSTART Plus Basic Functions

Introduction

This chapter describes the basic functions of the PICSTART Plus development system. Once the hardware and software are installed as described in Chapter 2, the various functions of PICSTART Plus can be used as described here. Chapter 4 provides a quick sample session using PICSTART Plus.

Highlights

This chapter covers

- **Enabling the PICSTART Plus**
- **Setting Configuration Bits and ID's**
- **Selecting the PICSTART Plus Target PIC16/17 Microcontroller**
- **The PICSTART Plus Program Status Window**
- **Programming a Microcontroller Device**
- **Verifying a Microcontroller Device**
- **Checking for a Blank Device**
- **Reading a Device Master**
- **Files Used by PICSTART Plus**

© 1996 Microchip Technology Inc.

Enabling the PICSTART Plus

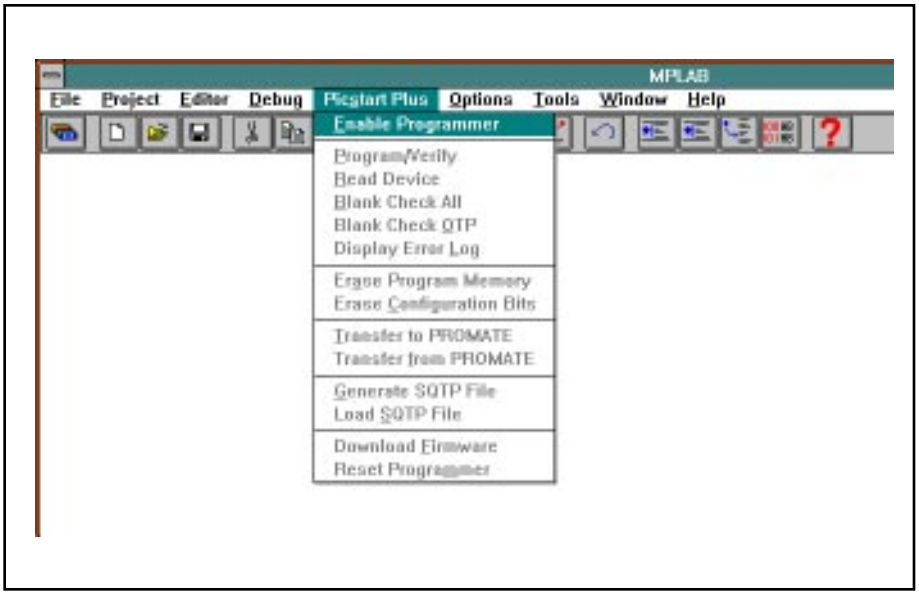


Figure 3.1 PICSTART Plus Programmer pull down menu

To enable PICSTART Plus, select the Programmer pull down menu and click **Enable Programmer** to establish communications with PICSTART Plus. Once the programmer is enabled, this dialog will show "Disable Programmer" and can be used to disable PICSTART Plus.

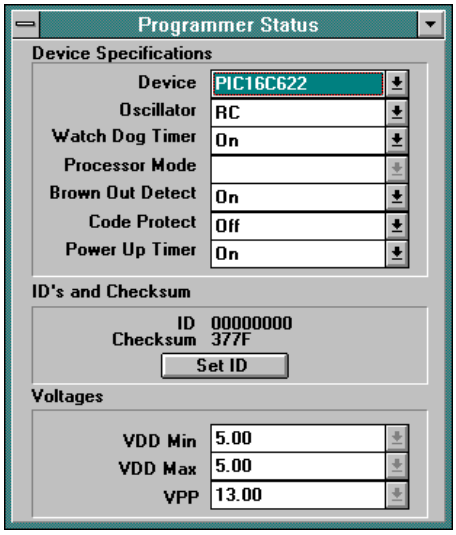


Figure 3.2 Programmer Status Dialog

© 1996 Microchip Technology Inc.

Programmer status dialog is displayed whenever the programmer is enabled. The options on the screen will show the current values if active, or will be disabled. Depending upon which processor you are currently configured for, these items will be enabled or grayed out. For the PICSTART Plus the voltage section is set to default voltage and cannot be changed.

From this dialog you can set these items (if they are setable in your currently selected microcontroller):

- Device - This sets the device type to use with PICSTART Plus
- Oscillator - This sets the configuration bits for the oscillator mode
- Watch Dog Timer - Configuration bit setting to enable WDT
- Processor Mode - For PIC17Cxx family processor mode select
- Brown Out Detect - For configuration bits that enable brown out detection
- Code Protect - For code protection bits
- Power Up Timer - For Timer power up bits

Pressing the **Set ID** button on the Programmer Status dialog will pop up the Edit ID Dialog.

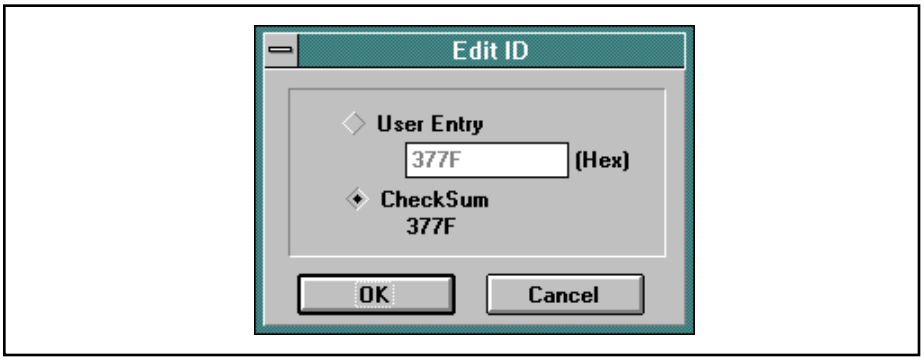


Figure 3.3 Edit ID Dialog

If a particular ID value is to be programmed, check the “User Entry” box and enter the 4-digit hex value for the ID. Click on **CheckSum** to have the checksum automatically programmed into the device. **OK** sets the option, **Cancel** cancels the screen and returns to the Programmer Status dialog.

Setting Configuration Bits and ID’s

Configuration bits can be manually entered from the Program Status dialog.

You can also specify the configuration bit values in your source code. Use the `__CONFIG` directive in MPASM to set the configuration bits for the device to be programmed. You can also use the `__IDLOCS` directive to set the ID bytes from MPASM. Each time you rebuild your project or reload your hex file, the configuration bits and ID locations will be set according to the values from these directives.

© 1996 Microchip Technology Inc.

The PICSTART Plus Program Status dialog

The Programmer Status dialog is shown on the screen whenever the PICSTART Plus is enabled. This dialog displays the current setting of the configuration bits for the target microcontroller.

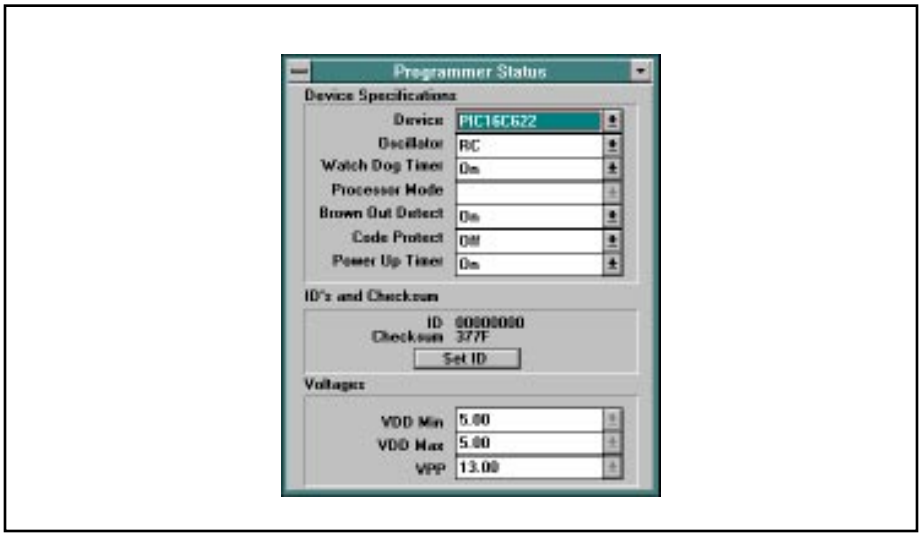


Figure 3.4 Programmer Status Dialog

Programming a Microcontroller Device

When you select Program/Verify from the PICSTART Plus menu, the following dialog will be activated:

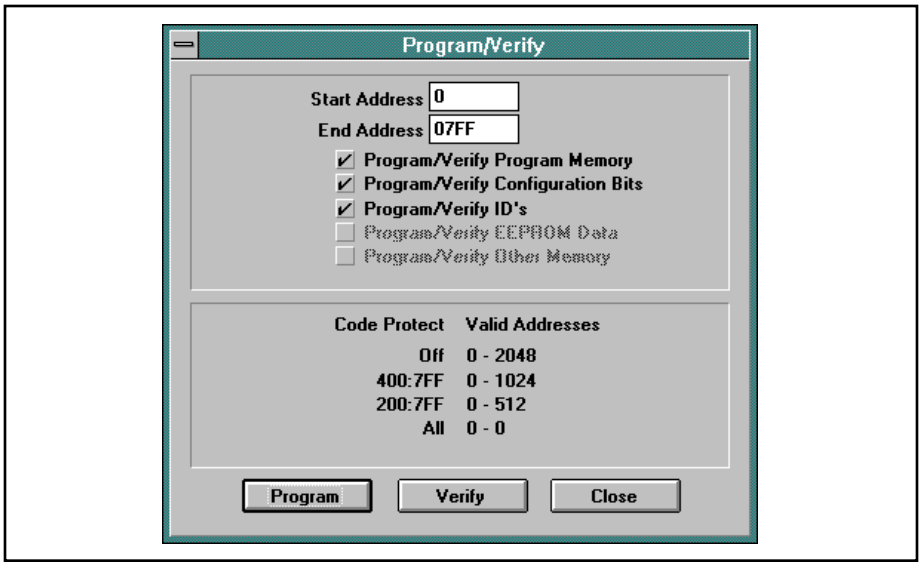


Figure 3.5 Program/Verify Dialog

© 1996 Microchip Technology Inc.

The Program/Verify Dialog is used to send code to the target device (Program) or to check that the data in the current device matches the code in the Program Memory window (Verify). For normal programming use the default addresses.

If you do not wish to program the configuration bits and the ID's with the values shown in the Programmer Status dialog, remove the checks from the second and third boxes.

Options not available on the currently selected processor will be grayed out, and cannot be selected.

When you select Program/Verify, the following sequence is initiated:

1. The PICSTART Plus checks to see if the selected areas are not blank. If the microcontroller device is not blank, PICSTART Plus asks if you want to continue.
2. PICSTART Plus automatically programs the selected options on the microcontroller device inserted in the socket.
3. PICSTART Plus performs a check of the selected options to verify the data programmed into the microcontroller device and returns the results of the verification. Although you can also select verify manually, the Verify option takes place every time a device is programmed.

Verifying a Microcontroller Device

You can choose to manually verify the contents of the target device at any time by selecting Verify from the Program/Verify dialog.

Checking for a Blank Device

The PICSTART Plus checks the microcontroller device to verify that all program locations contain ones (the erased state).

Reading a Device Master

PICSTART Plus reads the microcontroller device contents and copies the information into MPLAB's Program Memory window and Programmer Status dialog.

© 1996 Microchip Technology Inc.

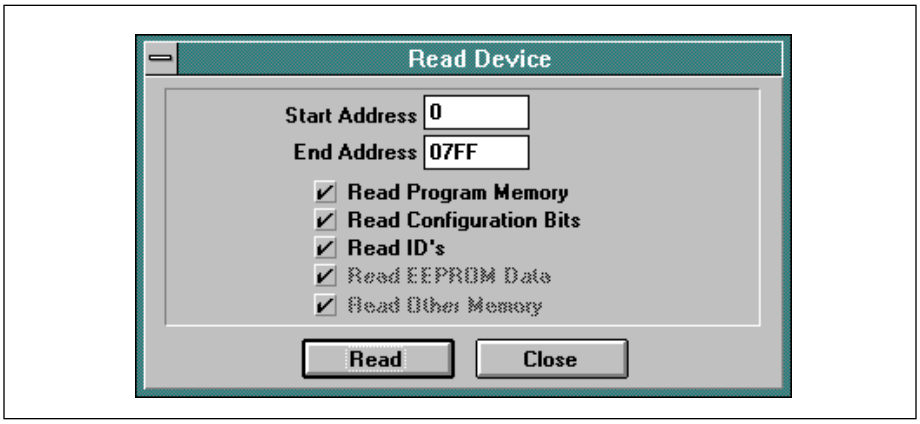


Figure 3.6 Read Device Dialog

The Read Device dialog is just like the top half of the Program/Verify dialog. Depending upon how you have MPLAB set up, reading a device will have different effects.

Program Memory and PICSTART Plus

For MPLAB, Program Memory can mean various things. When in the PICMASTER emulator mode, Program Memory shows the data that is in the emulation memory of the PICMASTER pod. This memory is read by the PICMASTER probe when you run, single step, or trace using the emulator. When in the simulator mode, the Program Memory window reflects memory as seen by MPLAB-SIM. This memory is read by MPLAB-SIM when you run, single step, or trace.

When you are in Editor Only mode, the Program Memory window is unavailable unless PICSTART Plus is enabled. When you are using PICSTART Plus, the Program Memory window represents data that is to be programmed into the target device inserted into PICSTART Plus, or represents data that has been read from the target device.

If you read memory from PICSTART Plus while in emulator or simulator mode, the emulator or simulator program memory will be overwritten.

Because of these various uses of the Program Memory window, you should be aware of potential "mis-matches" if you read data from a target device while you have an MPLAB project open. You will be given an option to either close the current MPLAB project or to continue and read the device's memory into the Program Memory window. Debug operations may not work properly, and data in other windows may not match the newly read data from PICSTART Plus.

© 1996 Microchip Technology Inc.

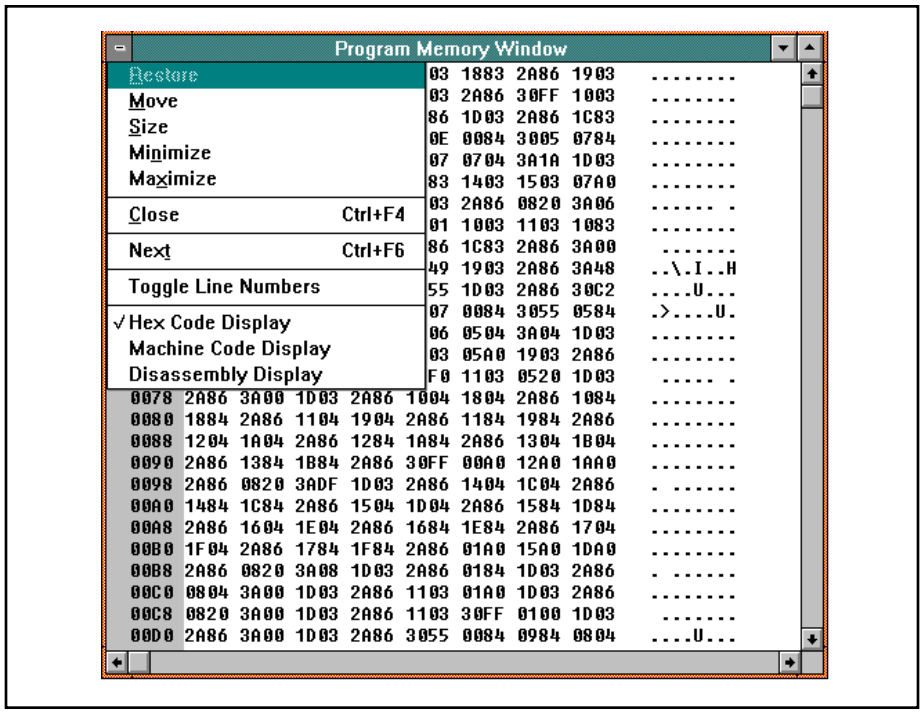


Figure 3.7 Program Memory Window

You can view the Program Memory in hex, machine code, or disassembler with symbols (if available).

Files Used by PICSTART Plus

PICSTART Plus can use information directly from MPLAB projects without any intermediate steps. MPASM can be used separately from MPLAB to produce hex files for PICSTART Plus. Alternatively, devices can be programmed with hex files from any PIC16/17 microcontroller compatible cross-assembler or cross-compiler.

If you are using MPASM separate from MPLAB, or are generating hex files from within MPLAB for use later with PICSTART Plus, you should use either INHX8M or INHX32 hex formats. MPASM's default output format for hex files is INHX8M. If you are programming PIC17CXX devices, you should use INHX32 format. See MPASM User's Guide for details on file formats.

© 1996 Microchip Technology Inc.

© 1996 Microchip Technology Inc.

Chapter 4. Using PICSTART Plus

Introduction

This chapter will cover the basic operation of the PICSTART Plus development programmer. This will cover the main steps for programming and reading a device.

Highlights

This chapter covers these topics:

- **Preliminary Setup Requirements**
- **Accessing MPLAB Tools and Menu Functions**
- **Loading PIC16/17 Hex Code**
- **Checking For a Blank Device**
- **Programming a Device**
- **Reading a Device Master**

Preliminary Setup Requirements

Make sure that you have gone through the hardware and software installation procedures as described in Chapter 2. You should have the PICSTART Plus development programmer connected to the PC with a cable to your serial port, and MPLAB should be communicating with PICSTART Plus as described in Chapter 3.

You should have an unprogrammed PIC16/17 device to use in this tutorial, and you should have some code to use, either in the form of a hex file, or as a source text file which can be built using an MPLAB project.

Accessing MPLAB Tools and Menu Functions

MPLAB functions are accessed from standard Windows 3.1 style pull down menus. The MPLAB menus are discussed at length in the MPLAB User's Guide. You can take the time to learn about MPLAB Projects and use the editor and simulator to write and debug your code if you wish.

If you already have your code finished, or prefer not to use the MPLAB IDE, you can simply use MPLAB as host software to import your code, and control PICSTART Plus. You will not need to read the MPLAB manual to use PICSTART Plus.

© 1996 Microchip Technology Inc.

Loading PIC16/17 Hex Code

Using PICSTART Plus without MPLAB Projects

If you have a .HEX file ready for programming into a PIC16/17 microcontroller, use the File menu to select *Import>Download to Memory* to load your code into the MPLAB Program Memory window. After you have loaded your code into MPLAB, use the PICSTART Plus pull down menu to select Program/ Verify. This will bring up the Program/Verify dialog and you can program your code into the device in the PICSTART Plus socket.

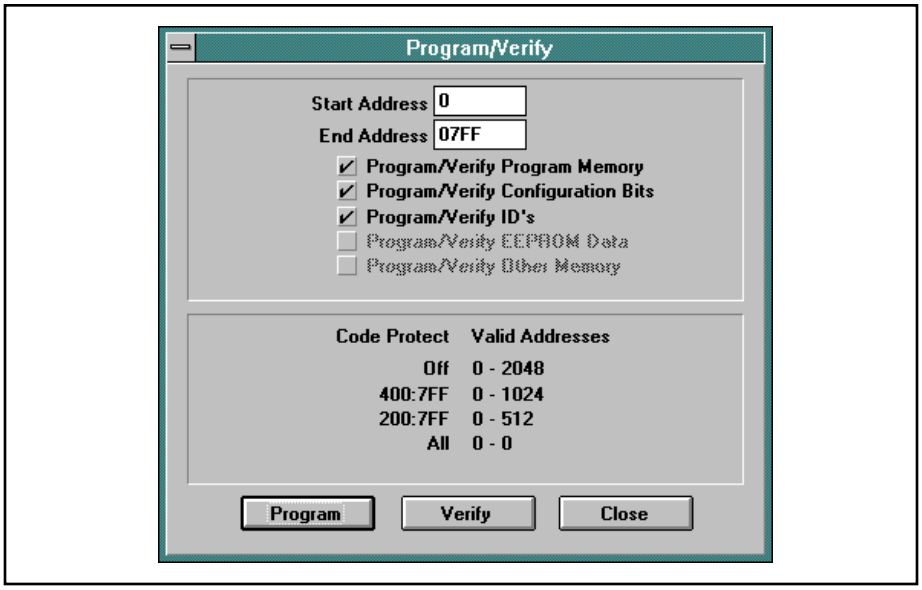


Figure 4.1 Program/Verify Dialog

Using PICSTART Plus with MPLAB Projects

If you have read the MPLAB User's Guide and are building your firmware code using an MPLAB project, code shown in the Program Memory window can be directly programmed into the PIC16/17 device. Select Program/Verify from the PICSTART Plus pull down menu, and click **Program**.

If you have configuration bits set in your source code, then every time you re-build your project, the configuration bits shown in Programmer Status dialog will be updated with those values. If you do not set configuration bits in your source code, then these bits will not be changed. You can manually change them from their default values and they will be programmed into the PIC16/17 device when you program the microcontroller.

© 1996 Microchip Technology Inc.

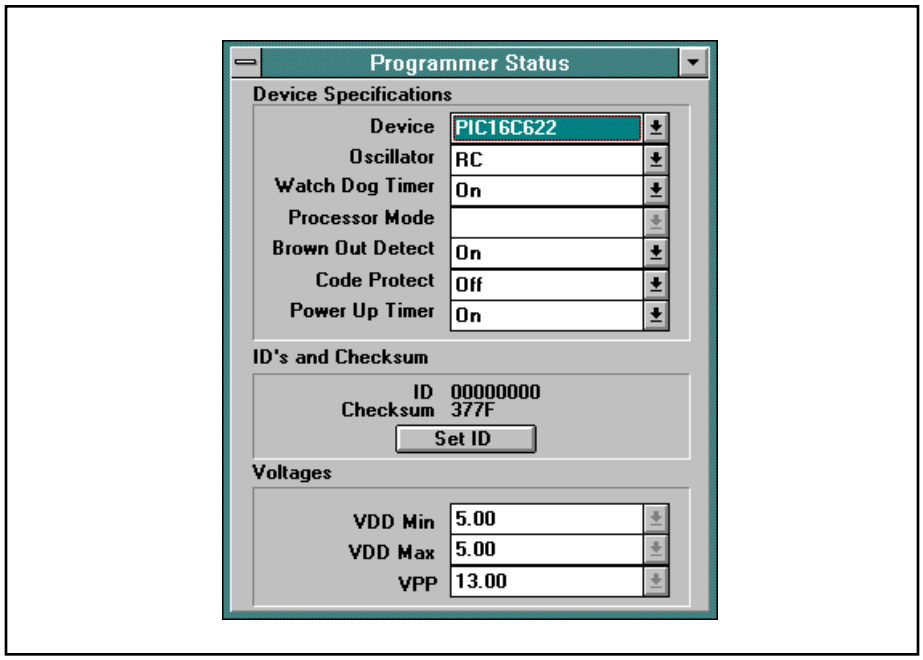


Figure 4.2 Programmer Status Dialog

You may change the device type for the programmer by selecting a new device.

Checking For a Blank Device

You can select *PICSTARTPlus>BlankCheckAll* to verify that a device is completely erased (all bits are set to a "1"). This will also verify that all configuration bits are set to a "1" (unprogrammed) state.

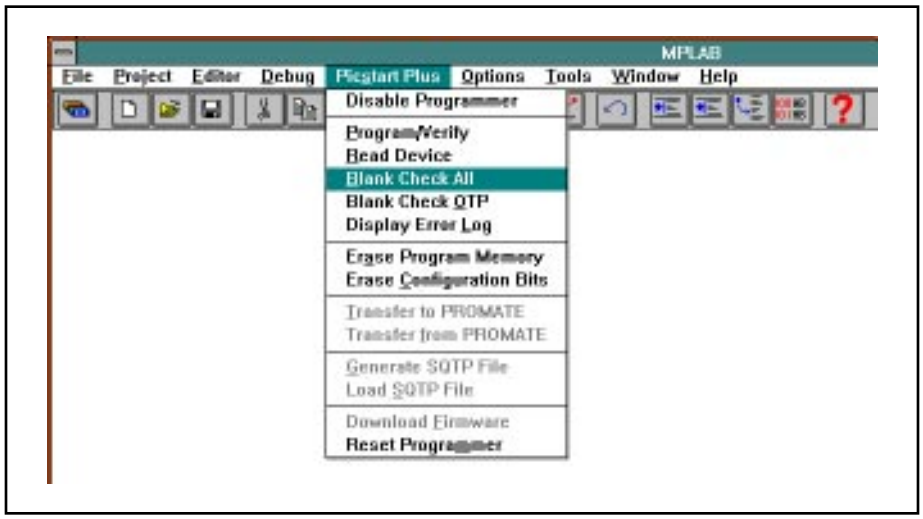


Figure 4.3 Blank Check All Menu Dialog

If you are using an OTP (one-time programmable) part, some configuration bits may be already programmed from the factory (oscillator bits, for instance). In that case you should select *PICSTARTPlus>BlankCheckOTP*. This will check that all program memory bits are set to one's, and that the configuration bits match the value in the Programmer Status dialog (Watch Dog Timer, Oscillator, etc.).

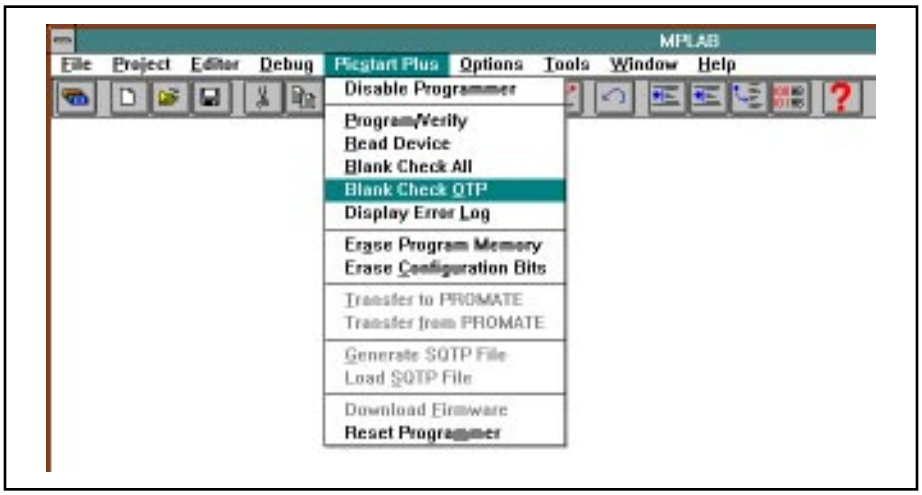


Figure 4.4 Blank Check OTP Menu Dialog

Programming a Device

Make sure that the device as shown on MPLAB's Programmer Status dialog is the same as the device you are ready to program.

Insert a device to be programmed into the PICSTART Plus socket. Position pin one on the device to be in the pin one position as shown on the diagram next to the socket.

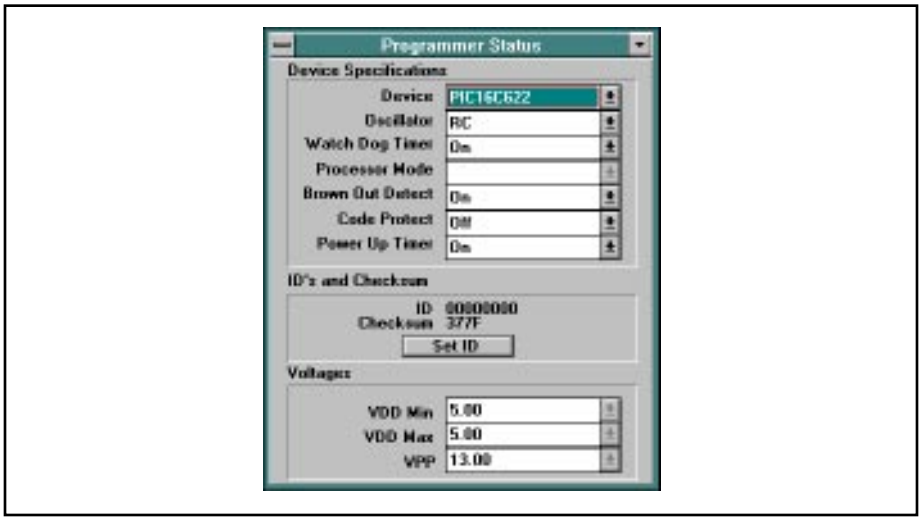


Figure 4.5 Programmer Status Dialog

© 1996 Microchip Technology Inc.

Select *PICSTARTPlus>Program/Verify* to bring up the Program/Verify dialog.

Ensure that the address range is correct and that the appropriate options are checked.

Click **Program**, and PICSTART Plus will program the data into your device. PICSTART Plus will immediately verify that the device was correctly programmed.

Reading a Device Master

If you want to copy the data from a programmed PIC16/17 device into an unprogrammed device, you can select *PICSTARTPlus>ReadDevice* to bring up the Read Device dialog. Leave the settings to their default state to read all of memory into MPLAB. Click **Read**.

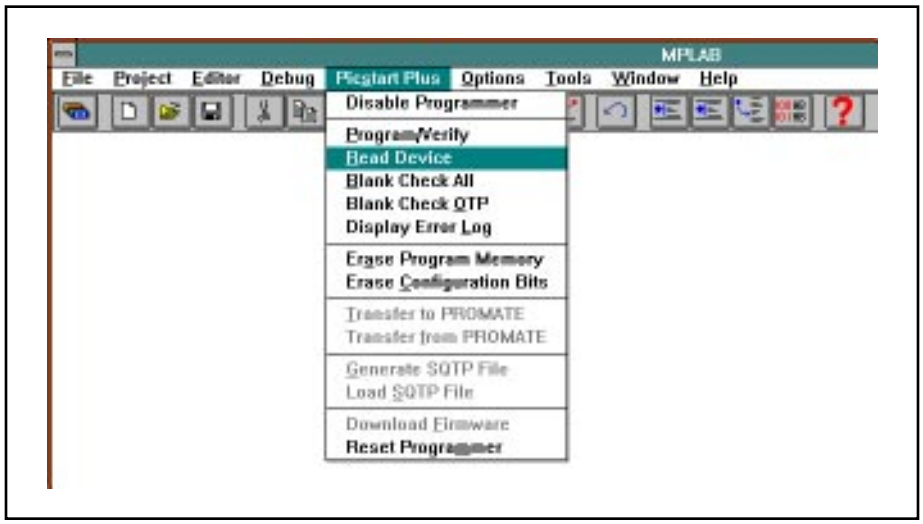


Figure 4.6 Menu Dialog

The Program Memory window will now show you the data read from the device master, and you can then save that data as a hex file, insert a new device into PICSTART Plus to copy that same data into a new device, or modify the data in MPLAB before you save or program another device.

Note:	Code protected devices can not be copied.

© 1996 Microchip Technology Inc.

Chapter 5. PICSTART Plus Menu Options

Introduction

This chapter covers all of the PICSTART Plus menu items on the MPLAB Integrated Development Environment, and details the PICSTART Plus dialogs that control device programming, reading, and verifying.

Programmer

Enable/Disable Programmer

This selection will enable or disable the PICSTART Plus operation. When *PICSTARTPlus>EnableProgrammer* is selected, MPLAB will attempt to establish communications with the PICSTART Plus. You will get an error message if the COM port is not set correctly, if the PICSTART Plus is not hooked up, or if the PICSTART Plus power supply is not connected.

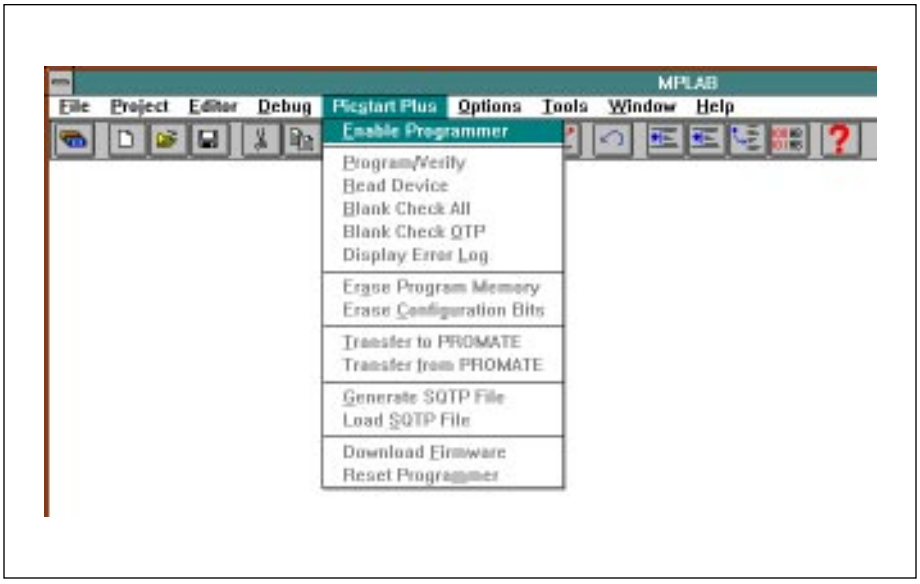


Figure 5.1 Programmer Enable Programmer Dialog

If you do not establish communications at first, you can correct the problem and select *PICSTARTPlus>EnableProgrammer* to try to again initialize the communications between MPLAB and PICSTART Plus.

If you are in MPLAB's Editor mode, then when you enable the PICSTART Plus, you will be presented with this dialog:

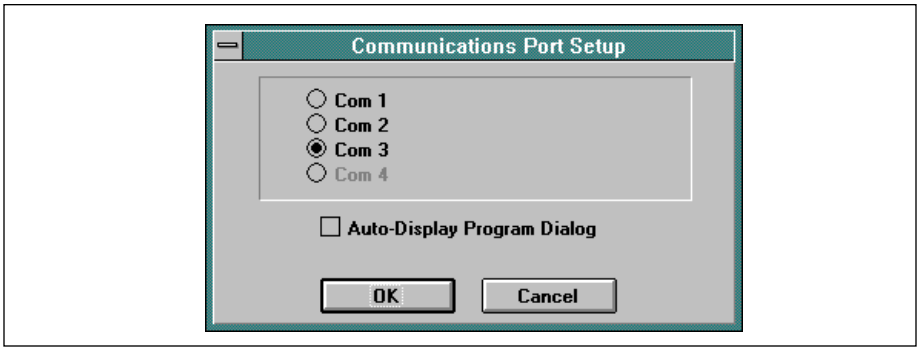


Figure 5.2 Communications Port Dialog

Make sure that the device you have installed in the PICSTART Plus socket matches the device as shown on the MPLAB Status bar (bottom of screen). If devices do not match, then they will not be programmed or read correctly.

If you are in MPLAB's Simulator or Emulator mode, you will not be presented with this dialog. The processor will be the same as selected in your MPLAB project or *Options>DevelopmentMode* dialog.

Program/Verify

Once communications are set up and you have selected the target device, you can either load your code from a .HEX file with *File>Import>DownloadToMemory* or directly from your recently built project. In both cases, the code will be shown in MPLAB's Program Memory window.

Select *PICSTARTPlus>Program/Verify* to bring up the Program/Verify dialog. From this dialog, you can either program the data as shown in MPLAB's Program Memory window, or verify that the data in the device in the PICSTART Plus socket matches data in MPLAB's Program Memory window.

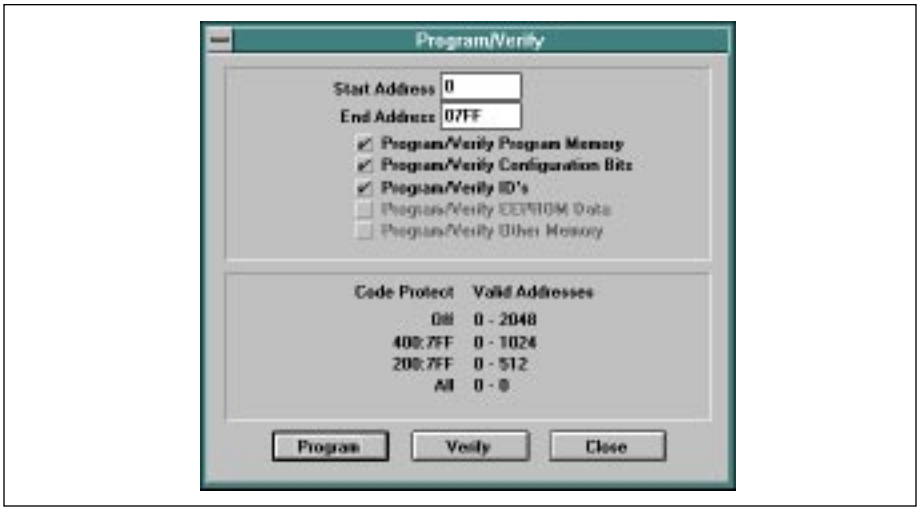


Figure 5.3 Program/Verify Dialog

© 1996 Microchip Technology Inc.

Using the check boxes on the Program/Verify dialog, you can select to program or verify only the program memory or other memory areas on the target device.

The Start Address and End Address will default to the start and end addresses of program memory on the selected device. You can change this to a smaller area by changing the addresses in these boxes.

The configuration bits are set from the Programmer Status dialog, which, in turn, can be set from your source code, or manually.

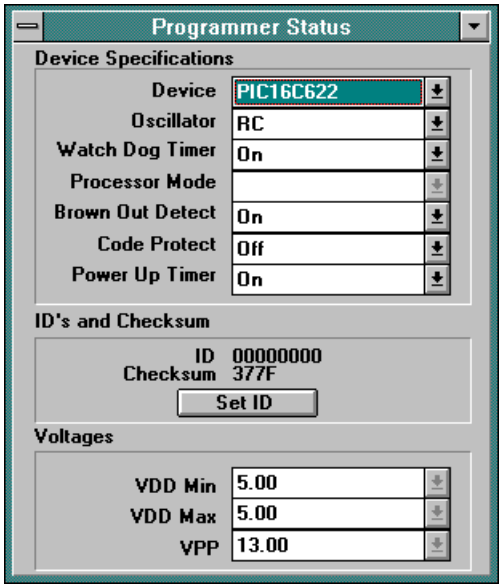


Figure 5.4 Program Status Dialog

Click **Set ID** on the Programmer Status dialog to bring up the Edit ID dialog to set the value entered into the on-chip ID memory.

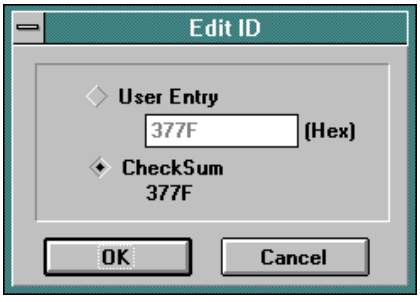


Figure 5.5 Edit ID Dialog

Read Device

When you select *PICSTARTPlus>ReadDevice*, the Read Device dialog will appear on your screen. Like the Program/Verify, you can set the program memory range and the other read options.

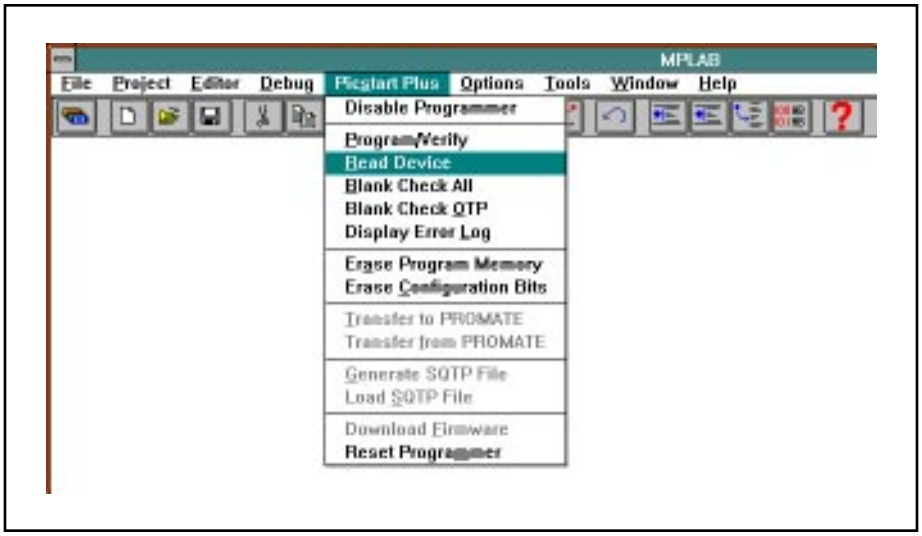


Figure 5.6 Read Device Dialog

After reading a device into MPLAB, its data will appear in the Program Memory window. Data can be changed using the Modify dialog, and it can be saved it to a hex file with *File>Export>SaveHexFile*.

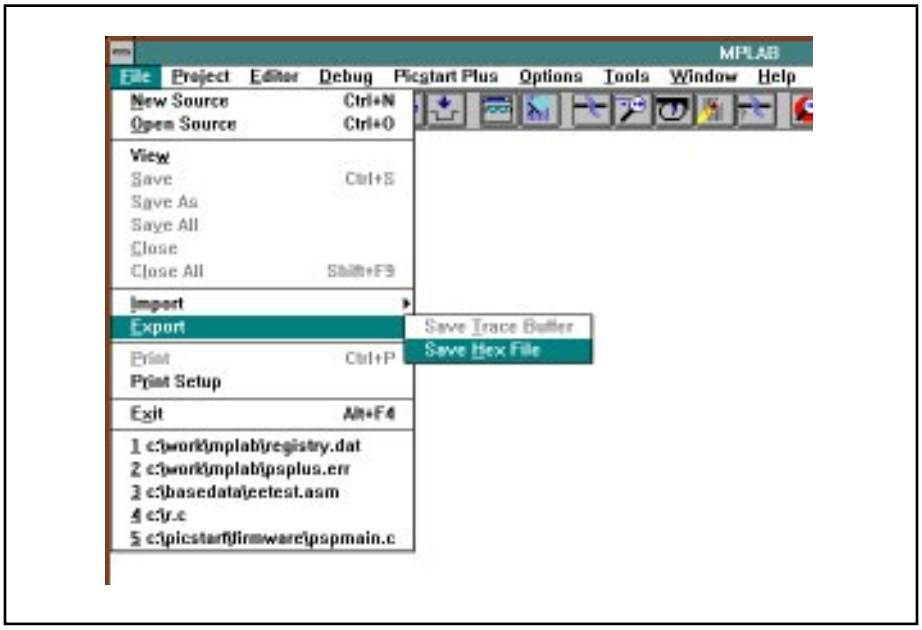


Figure 5.7 Save Hex File Dialog

© 1996 Microchip Technology Inc.

If you have a PICMASTER® emulator connected to MPLAB, your code will be downloaded to the emulated program memory of the PICMASTER. If you have a project open, you will be asked if you want to close it before reading memory from a device. If you elect to keep your project open be aware that the Absolute Listing window and the Source window may not match the data you have read into the Program Memory window. Symbols may not match the proper addresses in the Program Memory window, and code in the PICMASTER's memory, as shown in the Program Memory window, may be different than code shown in the Absolute Listing window.

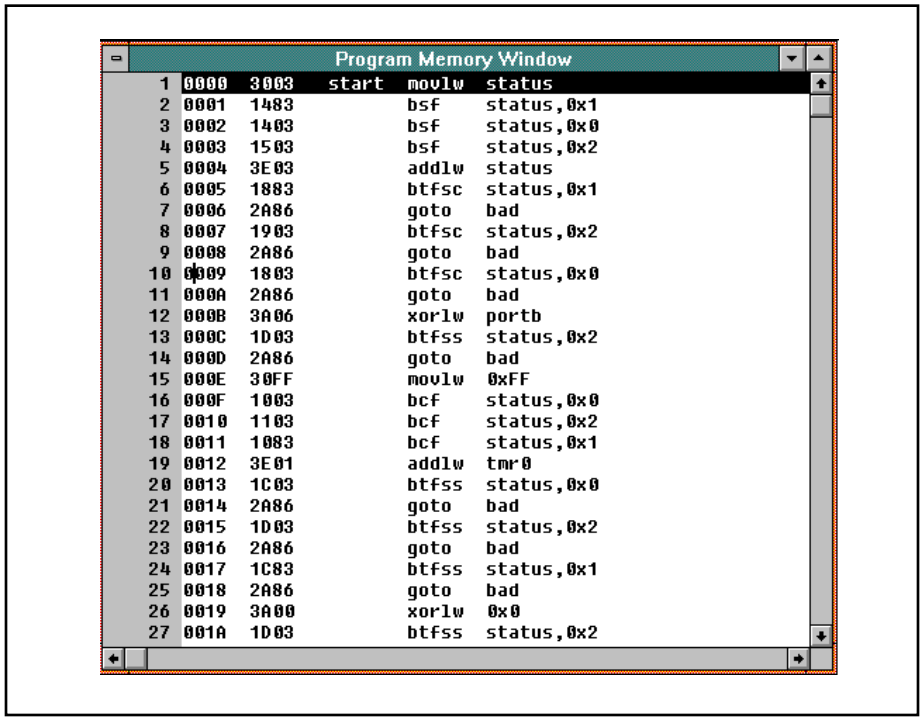

Program Memory Window
1 0000 3003 start movlw status
2 0001 1483 bsf status,0x1
3 0002 1403 bsf status,0x0
4 0003 1503 bsf status,0x2
5 0004 3E03 addlw status
6 0005 1883 btfsc status,0x1
7 0006 2A86 goto bad
8 0007 1903 btfsc status,0x2
9 0008 2A86 goto bad
10 0009 1803 btfsc status,0x0
11 000A 2A86 goto bad
12 000B 3A06 xorlw portb
13 000C 1D03 btfss status,0x2
14 000D 2A86 goto bad
15 000E 30FF movlw 0xFF
16 000F 1003 bcf status,0x0
17 0010 1103 bcf status,0x2
18 0011 1083 bcf status,0x1
19 0012 3E01 addlw tmr0
20 0013 1C03 btfss status,0x0
21 0014 2A86 goto bad
22 0015 1D03 btfss status,0x2
23 0016 2A86 goto bad
24 0017 1C83 btfss status,0x1
25 0018 2A86 goto bad
26 0019 3A00 xorlw 0x0
27 001A 1D03 btfss status,0x2

Figure 5.8 Program Memory Window

Blank Check All

You can select *PICSTARTPlus>BlankCheckAll* to verify that a device is completely erased (all bits are set to a "1"). This will also verify that all configuration bits are set to a "1" (unprogrammed) state.

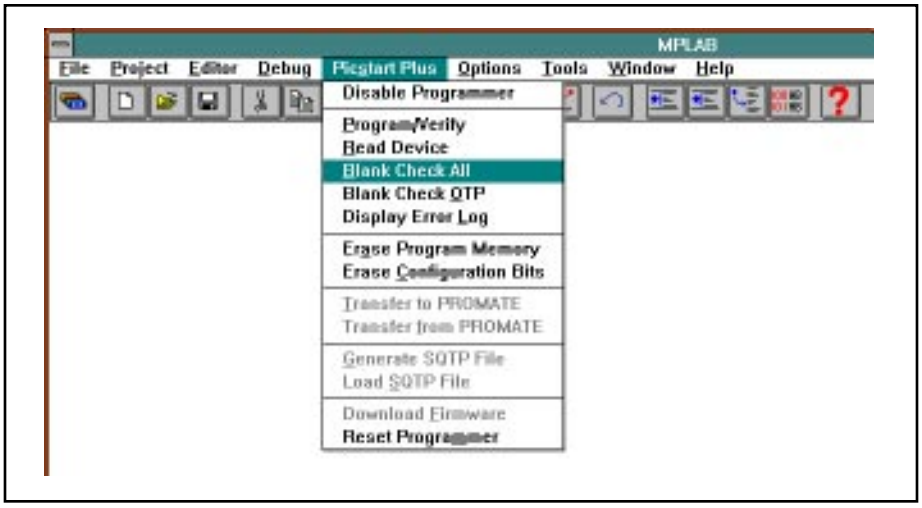


Figure 5.9 Blank Check All Dialog

If you are using an OTP part, some configuration bits may be already programmed from the factory (oscillator bits, for instance). In that case you should select *PICSTARTPlus>BlankCheckOTP.*

Blank Check OTP

If you are using an OTP part, some configuration bits may already be programmed from the factory (oscillator bits, for instance). In that case you should select *PICSTARTPlus>BlankCheckOTP.* This will check that all program memory bits are set to one's, and that the configuration bits match the value in the Programmer Status dialog (Watch Dog Timer, Oscillator, etc.).

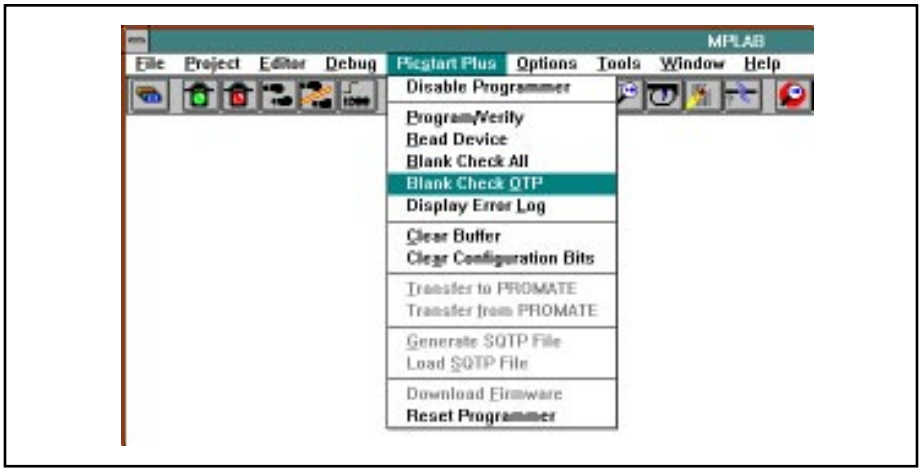


Figure 5.10 Blank Check OTP Dialog

© 1996 Microchip Technology Inc.

Display Error Log

When you have programmed a device or verified a device, an error window will show you data from memory in the device that do not match the corresponding memory in the Program Memory window.

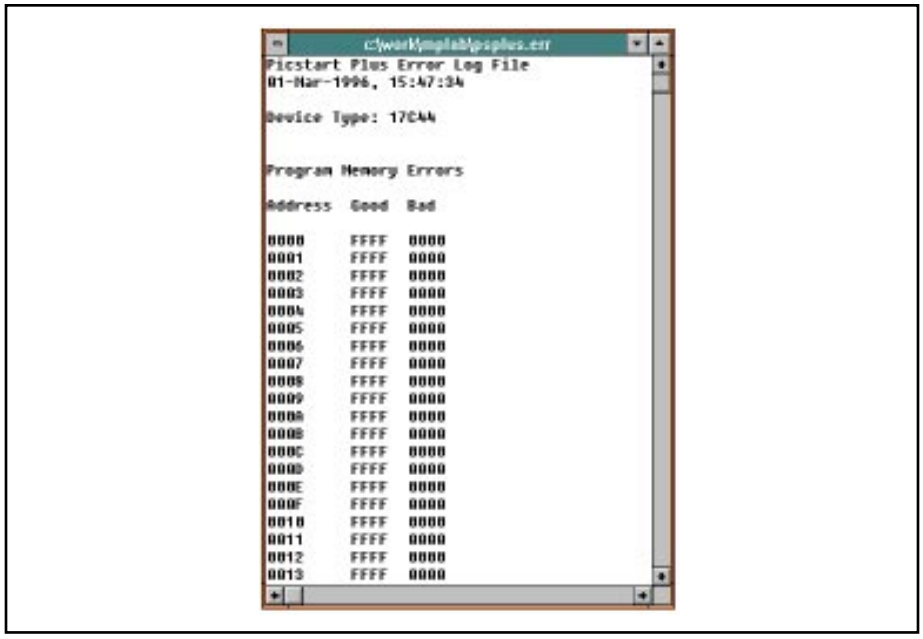


Figure 5.11 Display Error Log Dialog

Erase Program Memory

This will set all bits in the Program Memory window to ones. This option is not available if you also have the PICMASTER emulator or MPLAB SIM enabled. Use the *Debug>ClearProgramMemory* menu item to perform the same function in these modes.

Erase Configuration Bits

This option will set all available configuration bits to ones, their un-programmed state. If you then reload your hex file which has configuration data or if you rebuild your project which has configuration bits defined, these values will change in the Programmer Status dialog. You can use this to override the values in your code by selecting this after you have loaded your hex file or rebuilt your project.

Reset Programmer

This resets the PICSTART Plus hardware and re-establishes RS-232 communications. Use this if power has been disconnected from the PICSTART Plus. This does not reset programming information in the Program Manager window, configuration bits or IDs.

© 1996 Microchip Technology Inc.

Options

Programmer Options

The Communications Port Setup Dialog shows the possible PC serial communication ports.

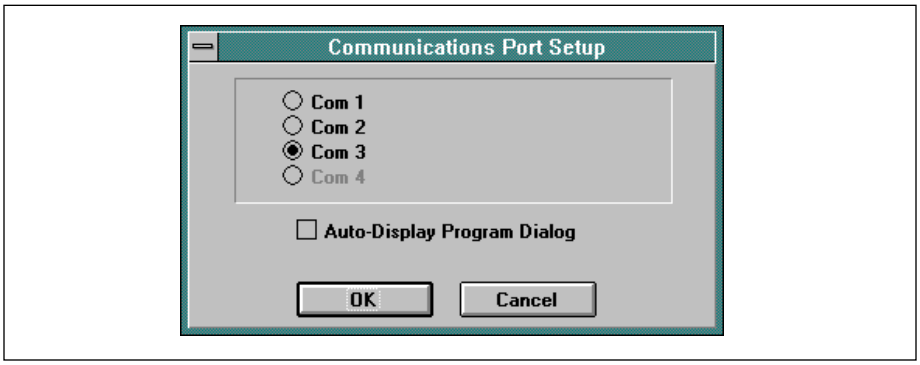


Figure 5.12 Communications Port Setup Dialog

If the Auto-Display Program dialog checkbox is checked, the Program/Verify dialog automatically pops up when the programmer is enabled.

OK sets the options. **Cancel** will ignore the changes and close the dialog.

© 1996 Microchip Technology Inc.

Chapter 6. Migrating from Other PICSTART Systems

If you have used previous Microchip PICSTART development systems, you should find PICSTART Plus to be easy to use. Install MPLAB as described in Chapter 2. "PICSTART Plus Installation." If you already have the serial cable installed, set the COM port from MPLAB's *Options>PICSTARTPlusSetup>CommunicationsPortSetup* menu.

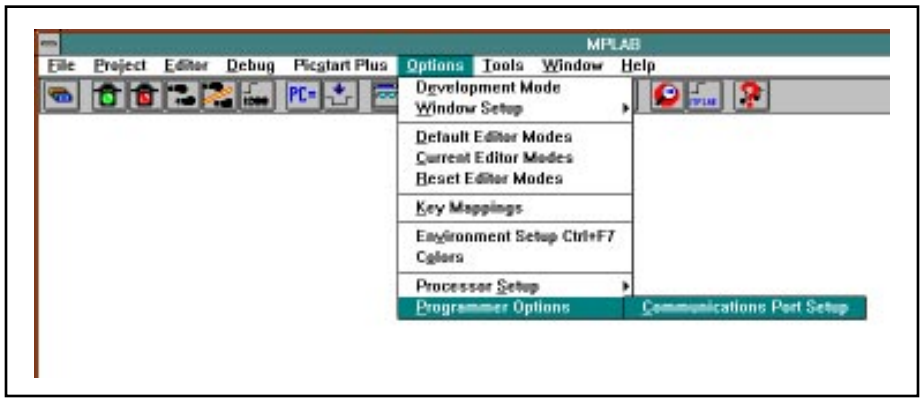


Figure 6.1 Programmer Setup Dialog Box

MPLAB offers you new features, such as:

- Disassembly of code read from target devices
- Save code as instructions so that you can generate source files
- Quickly program code from MPLAB projects
- Directly read code from a device in PICSTART Plus to the MPLAB-SIM simulator debugger, or to PICMASTER emulation memory for real-time debugging

© 1996 Microchip Technology Inc.

© 1996 Microchip Technology Inc.

Appendix A. Troubleshooting Guide

PROBLEM	CAUSE
MPLAB displays this message: **"Program memory contains code protected data. Proceed with programming?"**	Program memory contains data that was read from a code protected device. Most or all of this data is not usable. SOLUTION: Obtain the original hex code from a file or a non-protected device.
MPLAB displays this message: **"Failed to Establish Communication"**	MPLAB cannot communicate to the PICSTART Plus. SOLUTIONS: 1. Make sure that the RS-232 cable is connected, the power supply is connected, and the Power LED on the PICSTART Plus is on. 2. Make sure that a COM port is properly set up exclusively for use by PICSTART Plus. 3. Reselect device on Programmer Status window, or select Reset Programmer from the PICSTART Plus menu. Windows Users: A serial mouse will use a COM port,as will an external modem will. An internal modem has its own COM port, so if you have a second COM port on your PC, set it so it won't conflict with either the mouse or the modem. Win 95 Users: Note that Win 95 requires special attention to setting up COM ports. Check your computer BIOS settings to make sure that your board has an available COM port. A serial mouse will use a COM port, and an external modem will, too. An internal modem has its own COM port, so if you have a second COM port on your PC, set it so it won't conflict with either the mouse or the modem. Check the Ports (COM & LPT) under the System settings in the Control Panel. Check their *Properties>Resources* to ensure they are operating properly and that there are no conflicts.

© 1996 Microchip Technology Inc.

PROBLEM *(continued)*	**CAUSE** *(continued)*
	A Win 95 PC may have two COM ports, but might only have installed the serial port for the mouse. If you see in the System settings on the Control Panel that you have only a single COM port and you know that you have two, use the "Add New Hardware" program on the Control Panel to tell Win 95 that you have another COM port.
MPLAB displays this message: **"Hex file not found"**	The project did not generate a hex file. SOLUTION: Check the Make Project panel on MPLAB to ensure that a hex file is being generated when you assemble or compile.
When reading a device MPLAB gives the following warning message:**"Device is code protected. Program memory may be invalid."**	If you read a code protected device you will get this warning. SOLUTION: You cannot read the data from a code protected part.
When trying to enable the PICSTART Plus with MPLAB this message appears: **"Incompatible Software and Firmware Versions"**	The versions of software are mixed. Make sure to get the latest versions for both MPLAB and PICSTART Plus software.
LED's flicker or power LED does not come on.	1. Wrong part selected and thermal fuse is blown. 2. Device inserted wrong and thermal fuse is blown SOLUTION: Remove the device and cycle power on the Picstart plus to reset the internal thermal fuse.
Power LED does not light	1. Incompatible power supply 2. Power supply polarity is reversed. SOLUTION: Use the power supply included with the PICSTART Plus. If the unit still does not turn on, contact Microchip support.

© 1996 Microchip Technology Inc.

Appendix B. On Line Support

Introduction

Microchip provides two methods of on-line support. These are the Microchip BBS and the Microchip World Wide Web (WWW) site.

Use Microchip's Bulletin Board Service (BBS) to get current information and help about Microchip products. Microchip provides the BBS communication channel for you to use in extending your technical staff with microcontroller and memory experts.

To provide you with the most responsive service possible, the Microchip systems team monitors the BBS, posts the latest component data and software tool updates, provides technical help and embedded systems insights, and discusses how Microchip products provide project solutions.

The web site, like the BBS, is used by Microchip as a means to make files and information easily available to customers. To view the site, the user must have access to the Internet and a web browser, such as Netscape or Microsoft Explorer. Files are also available for FTP download from our FTP site.

Connecting to the Microchip Internet Web Site

The Microchip web site is available by using your favorite Internet browser to attach to:

www.microchip.com

The file transfer site is available by using an FTP service to connect to:

ftp.mchip.com/biz/mchip

The web site and file transfer site provide a variety of services. Users may download files for the latest Development Tools, Datasheets, Application Notes, User's Guides, Articles and Sample Programs.

A variety of Microchip specific business information is also available, including listings of Microchip sales offices, distributors and factory representatives. Other data available for consideration is:

- Latest Microchip Press Releases
- Technical Support Section with Frequently Asked Questions
- Design Tips
- Device Errata
- Job Postings
- Microchip Consultant Program Member Listing
- Links to other useful web sites related to Microchip Products

© 1996 Microchip Technology Inc.

Connecting to the Microchip BBS

Connect worldwide to the Microchip BBS using either the Internet or the CompuServe® communications network.

Internet: You can telnet or ftp to the Microchip BBS at the address **mchipbbs.microchip.com**

CompuServe Communications Network: In most cases, a local call is your only expense. The Microchip BBS connection does not use CompuServe membership services, therefore

You do not need CompuServe membership to join Microchip's BBS.

There is **no charge** for connecting to the BBS, except for a toll charge to the CompuServe access number, where applicable. You do not need to be a CompuServe member to take advantage of this connection (you never actually log in to CompuServe).

The procedure to connect will vary slightly from country to country. Please check with your local CompuServe agent for details if you have a problem. CompuServe service allow multiple users at baud rates up to 14400 bps.

The following connect procedure applies in most locations.

1. Set your modem to 8-bit, No parity, and One stop (8N1). This is not the normal CompuServe setting which is 7E1.
2. Dial your local CompuServe access number.
3. Depress **<Enter↵>** and a garbage string will appear because CompuServe is expecting a 7E1 setting.
4. Type +, depress **<Enter↵>** and Host Name: will appear.
5. Type **MCHIPBBS,** depress **<Enter↵>** and you will be connected to the Microchip BBS.

In the United States, to find the CompuServe phone number closest to you, set your modem to 7E1 and dial (800) 848-4480 for 300-2400 baud or (800) 331-7166 for 9600-14400 baud connection. After the system responds with `Host Name:`, type **NETWORK,** depress **<Enter↵>** and follow CompuServe's directions.

For voice information (or calling from overseas), you may call (614) 723-1550 for your local CompuServe number.

Using the Bulletin Board

The bulletin board is a multifaceted tool. It can provide you with information on a number of different topics.

- Special Interest Groups
- Files
- Mail
- Bug Lists

© 1996 Microchip Technology Inc.

Special Interest Groups

Special Interest Groups, or SIGs as they are commonly referred to, provide you with the opportunity to discuss issues and topics of interest with others that share your interest or questions. SIGs may provide you with information not available by any other method because of the broad background of the PIC16/17 user community.

There are SIGs for most Microchip systems, including:

- MPASM
- PRO MATE™
- PICSTART®
- Utilities
- Bugs
- TrueGauge®
- *fuzzy*TECH®-MP
- ASSP
- MTE1122
- MPLAB

These groups are monitored by the Microchip staff.

Files

Microchip regularly uses the Microchip BBS to distribute technical information, application notes, source code, errata sheets, bug reports, and interim patches for Microchip systems software products. Users can contribute files for distribution on the BBS. For each SIG, a moderator monitors, scans, and approves or disapproves files submitted to the SIG. No executable files are accepted from the user community in general to limit the spread of computer viruses.

Mail

The BBS can be used to distribute mail to other users of the service. This is one way to get answers to your questions and problems from the Microchip staff, as well as keeping in touch with fellow Microchip users worldwide.

Consider mailing the moderator of your SIG, or the SYSOP, if you have ideas or questions about Microchip products, or the operation of the BBS.

Software Releases

Software products released by Microchip are referred to by version numbers. Version numbers use the form:

```
xx.yy.zz
```

Where `xx` is the major release number, `yy` is the minor number, and `zz` is the intermediate number.

Intermediate Release

Intermediate released software represents changes to a released software system and is designated as such by adding an intermediate number to the version number. Intermediate changes are represented by:

- Bug Fixes
- Special Releases
- Feature Experiments

Intermediate released software does not represent our most tested and stable software. Typically, it will not have been subject to a thorough and rigorous test suite, unlike production released versions. Therefore, users should use these versions with care, and only in cases where the features provided by an intermediate release are required.

Intermediate releases are primarily available through the BBS.

Production Release

Production released software is software shipped with tool products. Example products are PRO MATE, PICSTART, and PICMASTER. The Major number is advanced when significant feature enhancements are made to the product. The minor version number is advanced for maintenance fixes and minor enhancements. Production released software represents Microchip's most stable and thoroughly tested software.

There will always be a period of time when the Production Released software is not reflected by products being shipped until stocks are rotated. You should always check the BBS or the WWW for the current production release.

Systems Information and Upgrade Hot Line

The Systems Information and Upgrade Line provides system users a listing of the latest versions of all of Microchip's development systems software products. Plus, this line provides information on how customers can receive any currently available upgrade kits. The Hot Line Numbers are: 1-800-755-2345 for U.S. and most of Canada, and 1-602-786-7302 for the rest of the world.

These phone numbers are also listed on the "Important Information" sheet that is shipped with all development systems. The hot line message is updated whenever a new software version is added to the Microchip BBS, or when a new upgrade kit becomes available.

© 1996 Microchip Technology Inc.

Appendix C. Connecting to a 25-Pin Serial Port

The following table gives the data for connecting the PICSTART Plus programmer to a 25-pin serial port. Connect the corresponding terminals indicated on each line of the table.

Table A.1 PC Host to PICSTART Plus Signals

25-pin (PC-Host)			9-pin (PICSTART Plus)	
2	TX	◄——►	3	RX
3	RX	◄——►	3	RX
20	DTR	◄——►	4	Data Ready
7	Common	◄——►	5	Common
6	DSR	◄——►	6	+5 volts
4	RTS	◄——►	7	CTS
5	CTS	◄——►	8	RTS

© 1996 Microchip Technology Inc.

© 1996 Microchip Technology Inc.

Glossary

Introduction

To provide a common frame of reference, this Glossary defines the terms that follow.

PICSTART Plus Terms

Application

A set of software and hardware developed by the user, usually designed to be a product controlled by a PIC16/17 microcontroller.

Assembler Source Code

A text file that is processed by an assembler to produce a one-to-one correspondence between assembler instructions and PIC16/17 machine code.

Asynchronous Stimulus

Data generated in real-time by the user to simulate external inputs to the simulator.

Breakpoint

An address where real-time execution of the firmware loaded in program memory will halt.

Build

A function that recompiles all the source files for an application.

C Code

A program written in the high level language called "C," and which will be converted into PIC16/17 machine code.

Caution

An alert that is provided to warn you of a situation that would cause physical damage to a device, software file, or equipment.

Compile

To translate a user's "C" source text code into machine code.

Configuration Bits

Unique bits programmed to set modes of operation. A configuration bit may or may not be preprogrammed.

Data RAM

General purpose file registers from RAM on the PIC16/17 device being emulated. The File Register window displays data RAM.

© 1996 Microchip Technology Inc.

DDE

See Dynamic Data Exchange.

Dynamic Data Exchange

The message protocol in Microsoft Windows that transfers information in real-time between windows applications. MPLAB acts as a DDE client that can transmit data to requesting applications, but cannot receive data from other applications.

EEPROM

Electrically Erasable Programmable Read Only Memory.

Emulation

The process of executing software loaded in the PICMASTER program memory on the emulator probe as if the firmware resided on the microcontroller device under development.

Emulation Memory

Program memory contained within the emulator.

Emulator

Hardware that performs emulation. *See Emulation*.

Emulator System

The Microchip Emulator System includes the PICMASTER Pod, the PC Interface Card, a Probe Kit, PRO MATE™ Device Programmer, Demonstration Board, Socket Module and the MPLAB Software.

Export

Send data out of MPLAB in a standardized format.

Extended Microcontroller Mode (PIC17CXX Devices Only)

In extended microcontroller mode, on-chip program memory as well as external memory is available. Execution automatically switches to external if the program memory address is greater than the internal memory space of the PIC17CXX device. Inaccessible memory in extended microcontroller mode includes fuses, test memory, and boot memory.

External RAM

Off-chip Read/Write memory.

File Registers

On-chip general purpose and special function registers.

Halt

The command that stops the emulator. Executing Halt is the same as stopping at a breakpoint. The program counter stops, and the user can inspect and change register values, and single step through code.

Hex Code

A file of executable instructions assembled or compiled from source code into standard hex format code. Hex code can be directly converted to object code.

© 1996 Microchip Technology Inc.

High Level Language

A language for writing programs that is of a higher level of abstraction from the processor than assembler code. High level languages employ a compiler to translate statements into machine instructions that the target processor can execute.

IDE

Integrated Development Environment. An application that has multiple functions for software development. The MPLAB IDE integrates a compiler, an assembler, a project manager, an editor, a debugger, simulator, and an assortment of other tools within one Windows 3.1 application. A user developing an application should be able to write code, compile, debug and test an application without leaving the MPLAB desktop.

Import

Bring data into the MPLAB Integrated Development Environment (IDE) from an outside source

Logic Probes

Up to fourteen logic probes connect to the Emulator. The logic probes provide external trace inputs, external trace halt signal, trigger output signal, external break input signal, trace buffer clock, +5V, and a common ground.

Make Project

A command that rebuilds an application, re-compiling only those source files that have changed since the last complete compilation.

Microcontroller Mode

One of the possible program memory configurations of the PIC17CXX family of microcontrollers. In microcontroller mode, only internal execution is allowed. Thus, only the on-chip program memory is available in microcontroller mode. Accessible memory includes: program memory, fuses, test memory, and boot memory (FE00h to FFFFh).

Microprocessor Mode

One of the possible program memory configurations of the PIC17CXX family of microcontrollers. In microprocessor mode, the on-chip program memory is not used. The entire 64K program memory is mapped externally. Inaccessible memory in microprocessor mode includes fuses, test memory, and boot memory.

MPLAB Software

The name of the main executable program that supports the IDE with an Editor, Project Manager, and Emulator/Simulator Debugger. The MPLAB Software resides on the PC host. The executable file name is MPLAB.EXE. MPLAB.EXE calls many other files.

MRU

Most Recently Used. Refers to files and windows available to be selected from MPLAB main pull down menus.

Object code

The machine code that is produced from the source code after it is processed by an assembler or compiler. This code will be-the memory-resident code that will run on the PIC16/17 in the user's application.

Off-Chip Memory

Off-chip memory refers to the memory selection option for the PIC17CXX device where memory may reside on the target board, or where all program memory may be supplied by the Emulator. *Options > Processor Setup > Hardware* provides the Off-Chip Memory selection dialog box.

Pass Counter

A counter that decrements each time an event (such as the execution of an instruction at a particular address) occurs. When the pass count value reaches zero, MPLAB halts the processor. You can assign the Pass Counter to either break logic or to trace logic.

PC

Any IBM or compatible Personal Computer. MPLAB needs a 386X or better machine.

PC Host

The computer running Windows 3.x.

PC Interface Card

A Microchip proprietary parallel interface card allowing the MPLAB software residing on the PC to communicate with the PICMASTER emulator.

PIC16/17

PIC16/17 refers to the PIC16C5X, PIC16CXX, and PIC17CXX Microchip microcontroller families.

PICMASTER

The hardware unit that provides tools for emulating and debugging firmware applications and is also referred to as the Emulator, and PICMASTER. This unit contains Emulation memory, breakpoint logic, counters, timers, and a trace analyzer among some of its tools.

Pod

The external emulator box that contains emulation memory, trace memory, event and cycle timers, and trace/breakpoint logic. Occasionally used as an abbreviated name for the PICMASTER Universal In-Circuit Emulator.

Power on Reset Emulation

A software randomization process that writes random values in data RAM areas to simulate uninitialized values in RAM upon initial power application.

© 1996 Microchip Technology Inc.

Probe

A device specific interface between the simulator and the target application. The probe connects to the emulator via a ribbon cable, and the target application board connects to the probe via a ribbon cable. The probe is sometimes called the header board.

Program Counter

A register that specifies the current execution address.

Program Memory

Memory in the emulator containing the downloaded target application firmware.

Project

A set of source files to build the object code for an application.

Prototype System

A term referring to a user's target application, or target board.

Radix

The number base, hex, or decimal, used in selecting an address and for entering data in the *Window > Modify* command.

Run

The command that releases the emulator from halt, allowing it to run the application code and change or respond to I/O in real time.

SFR

Special Function Registers.

Simulator

A software program that models the operation of the PIC16/17 microprocessor.

Simulator Stimulus

Data generated to exercise the response of simulation to external signals. Often the data is put into the form of a list of actions in a text file.

Single Step

This command steps though code, one instruction at a time. After each instruction, MPLAB updates register windows, watch variables, and status displays so you can analyze and debug instruction execution.

You can also single step C compiler source code, but instead of executing single instructions, MPLAB will execute all assembly level instructions generated by the line of the high level C statement.

Source

Source code, usually a text file of assembly instructions or C code.

Special Function Registers

Registers that control I/O processor functions, I/O status, timers, or other modes or peripherals.

Stack

"Push-Down" list of calling routines. Each time a PIC16/17 microcontroller executes a call, the software pushes the return address to the stack. A RET or RETLW command pops the address from the stack.

Static RAM, or SRAM

Static Random Access Memory. Program memory you can Read/Write on the target board that does not need refreshing frequently.

Step-Into

This command is the same as Single Step. Step-Into (as opposed to Step-Over) follows a CALL instruction into a subroutine.

Step-Over

Step-Over allows you to debug code without stepping into subroutines. When stepping over a CALL instruction, the next breakpoint will be set at the instruction after the CALL. If for some reason, the subroutine gets into an endless loop or does not return properly, the next breakpoint will never be reached.

The Step-Over command is similar to Single Step except for its handling of CALL instructions.

Stopwatch

A 48-bit counter for measuring execution cycles.

Symbol

An label usually produced by an assembler or compiler that refers to machine locations by function names, variable locations, constant declarations, source line-number, or other reference to user source code.

System Button

The System Button is located in the upper left corner of Windows and some dialogs. This button usually has "Minimize", "Maximize", and "Close." In some MPLAB windows, additional modes or functions can be found under the System Button.

Target

Refers to a user application.

Target Application

Firmware residing on the target board.

Target Board

The circuitry and programmable device that makes up the target application.

© 1996 Microchip Technology Inc.

Target Processor

The microcontroller device on the target application board that is being emulated or simulated.

Template

Lines of text that you build for inserting into your files at a later time. The MPLAB Editor stores templates in template files.

Tool Bar

A row or column of icons that you can click on to execute MPLAB functions.

Trace

An emulator or simulator function that logs program execution in real-time.

Trigger Output

Trigger output refers to an output signal that can be generated at any address or address range, and is independent of the trace, arm, and breakpoint settings. Any number of trigger output points can be set. The trigger output signal is available on logic probe pin 13 (white probe tip).

Watch Dog Timer

A timer on a PIC16/17 microcontroller that resets the processor after a selectable length of time.

Watch Variable

A variable that you may monitor during a debugging session. Watch windows contain a list of watch variables that are updated at each breakpoint.

© 1996 Microchip Technology Inc.

Index

Symbols

__CONFIG 11
__IDLOCS 11

B

BBS 5
    application notes 37
    bug reports 37
    Connecting to 36
    errata sheets 37
    Software Releases 37
    source code 37
    Special Interest Groups 37
    Systems Information and Upgrade Hot Line 38
    Using the 36
Blank Check 13, 19, 28
Blank Check OTP parts 20, 28
Brown Out Detect 11

C

CE 1
Checksum 11
Code Protect bits 11
Code protected parts 21
Communications port set up 7, 8, 30
Configuration Bits
    current setting 12
    default 11
    Erase 29
    setting in source code 11
    setting manually 11
Customer Support 5

D

Development Mode, MPLAB 24
Disable Programmer 10, 23

E

Edit ID 11
Editor, MPLAB 24
Emulator 27
Enable Programmer 10, 23
Erase Buffer 29
Error Log 29

H

Hardware, Installation 7
HEX files 11, 15

I

ID 11
    setting in source code 11
    setting manually 11
Installation
    Hardware 7
    Software 8
Internet
    Connecting to Microchip web site 35

M

Memory
    Loading in MPLAB Projects .18
Mode
    Processor 11
Modem 7
MPASM 15
MPLAB 1, 3, 23
    configuring for PICSTART Plus 8
MPLAB-SIM 14

O

Oscillator 11

P

Power Supply 7
Power Up Timer 11
Program 14
Program Memory
    Debug considerations 14
    Edit 14
    PICMASTER 14
    PICSTART Plus 14
    Simulator 14
Program Memory Window 14
Program Status dialog 11, 12
Program/Verify dialog 12, 24
Programmer Menu 10
Project, MPLAB 18

R

Read Device dialog 14, 26
Reading a Device 13, 21, 26
RS-232 7

S

Serial Port 8, 39
Software Releases 37
    Intermediate Release 38
    Production Release 38
Software, Installation 8
Support
    Customer 5

V

Verify 13

W

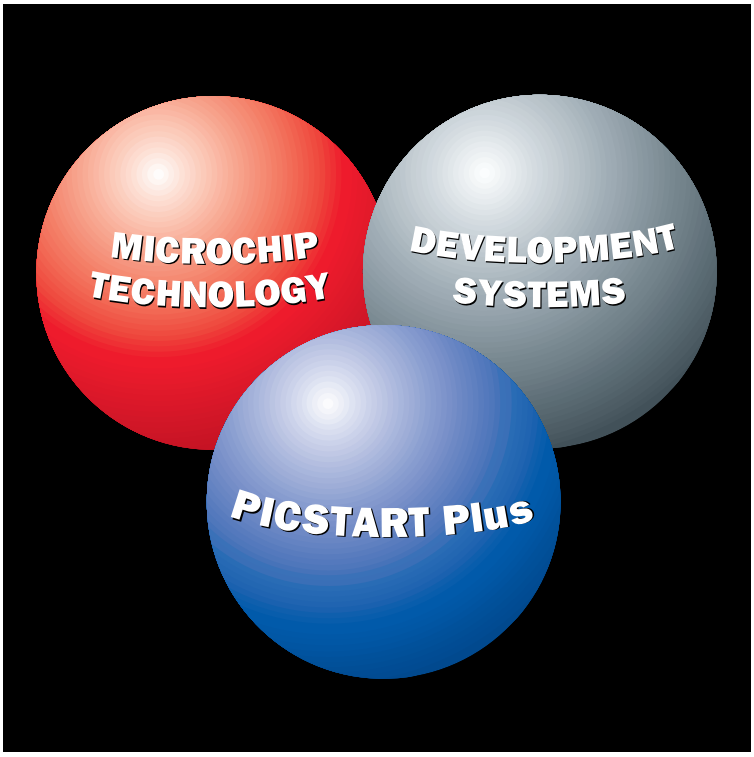
Warranty 5
Watch Dog Timer 11
WDT 11
Web Site
    connecting to 35
    file transfer 35
Windows 1
World Wide Web 5

© 1996 Microchip Technology Inc.

© 1996 Microchip Technology Inc.

INDEX

PICSTART® Plus
DEVELOPMENT SYSTEM



USER'S GUIDE

MICROCHIP

WORLDWIDE SALES & SERVICE

AMERICAS

Corporate Office
Microchip Technology Inc.
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 602 786-7200 Fax: 602 786-7277
Technical Support: 602 786-7627
Web: http://www.microchip.com

Atlanta
Microchip Technology Inc.
500 Sugar Mill Road, Suite 200B
Atlanta, GA 30350
Tel: 770 640-0034 Fax: 770 640-0307

Boston
Microchip Technology Inc.
5 Mount Royal Avenue
Marlborough, MA 01752
Tel: 508 480-9990 Fax: 508 480-8575

Chicago
Microchip Technology Inc.
333 Pierce Road, Suite 180
Itasca, IL 60143
Tel: 708 285-0071 Fax: 708 285-0075

Dallas
Microchip Technology Inc.
14651 Dallas Parkway, Suite 816
Dallas, TX 75240-8809
Tel: 214 991-7177 Fax: 214 991-8588

Dayton
Microchip Technology Inc.
Suite 150
Two Prestige Place
Miamisburg, OH 45342
Tel: 513 291-1654 Fax: 513 291-9175

Los Angeles
Microchip Technology Inc.
18201 Von Karman, Suite 1090
Irvine, CA 92715
Tel: 714 263-1888 Fax: 714 263-1338

AMERICAS *(continued)*

New York
Microchip Technology Inc.
150 Motor Parkway, Suite 416
Hauppauge, NY 11788
Tel: 516 273-5305 Fax: 516 273-5335

San Jose
Microchip Technology Inc.
2107 North First Street, Suite 590
San Jose, CA 95131
Tel: 408 436-7950 Fax: 408 436-7955

CANADA

Microchip Technology Inc.
5925 Airport Road, Suite 200
Mississauga, Ontario L4V 1W1, Canada
Tel: 905 405-6279 Fax: 905 405-6253

ASIA/PACIFIC

Hong Kong
Microchip Technology
Unit No. 3002-3004, Tower 1
Metroplaza
223 Hing Fong Road
Kwai Fong, N.T. Hong Kong
Tel: 852 2 401 1200 Fax: 852 2 401 3431

Korea
Microchip Technology
168-1, Youngbo Bldg. 3 Floor
Samsung-Dong, Kangnam-Ku,
Seoul, Korea
Tel: 82 2 554 7200 Fax: 82 2 558 5934

Singapore
Microchip Technology
200 Middle Road
#10-03 Prime Centre
Singapore 188980
Tel: 65 334 8870 Fax: 65 334 8850

Taiwan
Microchip Technology
10F-1C 207
Tung Hua North Road
Taipei, Taiwan, ROC
Tel: 886 2 717 7175 Fax: 886 2 545 0139

EUROPE

United Kingdom
Arizona Microchip Technology Ltd.
Unit 6, The Courtyard
Meadow Bank, Furlong Road
Bourne End, Buckinghamshire SL8 5AJ
Tel: 44 1 628 850303 Fax: 44 1 628 850178

France
Arizona Microchip Technology SARL
Zone Industrielle de la Bonde
2 Rue du Buisson aux Fraises
91300 Massy - France
Tel: 33 1 69 53 63 20 Fax: 33 1 69 30 90 79

Germany
Arizona Microchip Technology GmbH
Gustav-Heinemann-Ring 125
D-81739 Muenchen, Germany
Tel: 49 89 627 144 0 Fax: 49 89 627 144 44

Italy
Arizona Microchip Technology SRL
Centro Direzionale Colleoni
Palazzo Taurus 1
V. Le Colleoni 1
20041 Agrate Brianza, Milan Italy
Tel: 39 39 689 9939 Fax: 39 39 689 9883

JAPAN

Microchip Technology Intl. Inc.
Benex S-1 6F
3-18-20, Shin Yokohama
Kohoku-Ku, Yokohama
Kanagawa 222 Japan
Tel: 81 45 471 6166 Fax: 81 45 471 6122

4/16/96

MICROCHIP

All rights reserved. © 1996, Microchip Technology Incorporated, USA.

Information contained in this publication regarding device applications and the like is intended through suggestion only and may be superseded by updates. No representation or warranty is given and no liability is assumed by Microchip Technology Incorporated with respect to the accuracy or use of such information, or infringement of patents or other intellectual property rights arising from such use or otherwise. Use of Microchip's products as critical components in life support systems is not authorized except with express written approval by Microchip. No licenses are conveyed, implicitly or otherwise, under any intellectual property rights. The Microchip logo and name are registered trademarks of Microchip Technology Inc. in the U.S.A. and other countries. All rights reserved. All other trademarks mentioned herein are the property of their respective companies.